

pld

F-4200

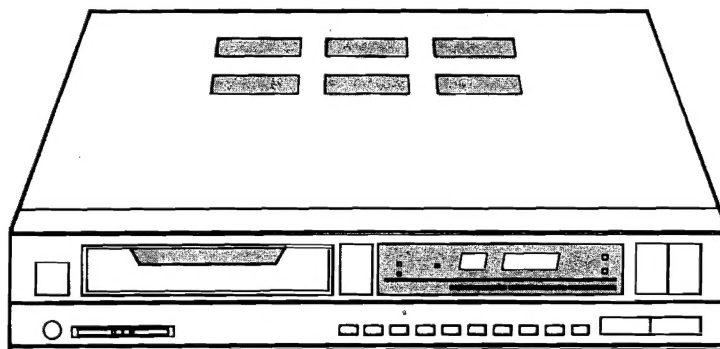


V08232

# SERVICE MANUAL


## COMPACT DISC DIGITAL AUDIO PLAYER

COMPACT  
**disc**  
DIGITAL AUDIO



## **WARNING**

FOR CONTINUED SAFETY THE FOLLOWING PRECAUTIONS TO BE FOLLOWED DURING SERVICING

1. MAKE SURE POWER CORD IS DISCONNECTED BEFORE REPLACING ANY PARTS.
2. REPLACE WITH SAME TYPE, CRITICAL PARTS WITH  MARK ON THIS DIAGRAM.
3. THE FOLLOWING TEST MUST BE IMPLEMENTED AFTER EACH REPAIR BEFORE RETURNING IT TO CUSTOMER.

USE AN OHM-METER TO MEASURE THE D.C. RESISTANCE FROM BOTH A.C. CONDUCTORS TO ANY EXPOSED METALLIC PARTS SUCH AS A SCREW HEAD, METAL INLAYS ETC, THE RESISTANCE MEASURED TO BE 10 MEGAOHMS MINIMUM.

## CONTENTS

SPECIFICATION .....	1
DISASSEMBLY .....	2
EXPLODED VIEW-CABINET .....	5
EXPLODED VIEW-MECHANISM .....	6
EXPLODED VIEW PARTS LIST .....	7
ALIGNMENT AND ADJUSTMENT .....	8
DESCRIPTION OF INTERFACE .....	11
TROUBLESHOOTING .....	14
SCHEMATIC DIAGRAM .....	18
P.C BOARD .....	20
BLOCK DIAGRAM .....	22
WIRING DIAGRAM .....	23
ELECTRICAL PARTS LIST .....	24

# SPECIFICATIONS

## AUDIO SPECIFICATIONS

Number of channels	2
Signal/Noise Ratio	95dB
Harmonic Distortion	0.01% (at 1 KHz)
Frequency Response	5-20000Hz ( $\pm 1$ dB)
Channel Separation	85dB
Wow/Flutter	Not measurable
Output Voltage	2.0V (TYP)

## SIGNAL FORMAT

Sampling Frequency	44.1 KHz
Error Correction System	CIRC double error correction system
D/A Conversion	16 bit linear

## GENERAL SPECIFICATION

Power Requirements	100/120/220/240V 50/60Hz
Power Consumption	10W
Dimensions (W x H x D)	420 x 73 x 282mm
Weight	3.7Kg

## PERFORMANCE SPECIFICATIONS

	NOMINAL	LIMIT
Output Level	2.0V $\pm$ 0.2V	2.0V $\pm$ 0.5V
Channel Unbalance	$\pm 0.2$ dB	$\pm 1$ dB
Frequency Response		
20Hz	$\pm 0.5$ dB	$\pm 1$ dB
10KHz	$\pm 0.5$ dB	$\pm 1$ dB
20KHz	+0.5 -1 dB	$\pm 2.5$ dB
Signal to Noise Ratio	95dB	90dB
Channel Separation		
1KHz	85dB	80dB
10KHz	80dB	70dB
Total Harmonic Distortion		
1KHz	0.01%	0.02%
10KHz	0.03%	0.1%
20KHz	0.8%	2.5%
Dynamic Range	90dB	80dB

## PICK UP

Type	Astigma 3 beam
Light Source	Semiconductor laser
Wave Length	780nm

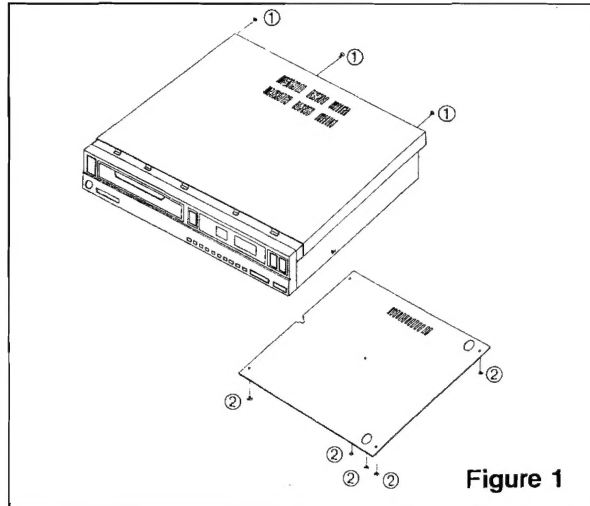
## ACCESSORIES

• • •NOTE:

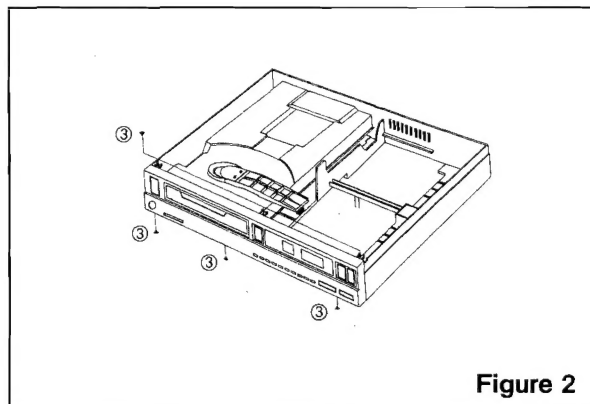
Nominal Specs represent the design specs; all units should be able to approximate these . . . some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit perform to less than within any limit spec.

## DISASSEMBLY

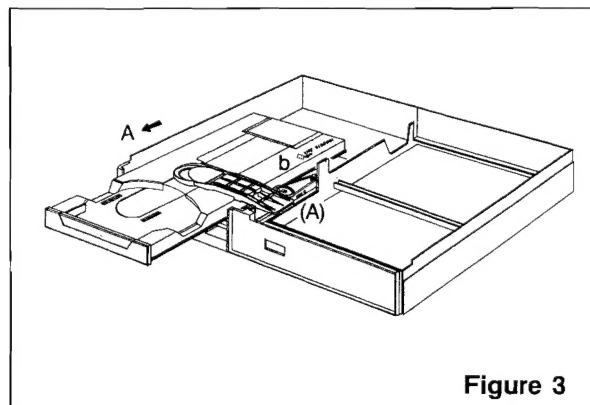
1. To Remove the cover and the bottom cover (Figure 1) Remove 3 screws ① and 5 screws ②



2. To Remove the Front Panel (Figure 2) After taking off the cover and bottom cover, remove 7 screws ③



3. To Remove the TRAY Mechanism Ass'y (Figure 3) After taking off the front panel, rotate the pulley (A) right and extract tray to A direction till reach to tray stopper (b), and extract the tray to A direction after pushing the tray stopper.



4. To Remove the Mechanism (Figure 4)  
After taking off the tray, remove 4 screws ④

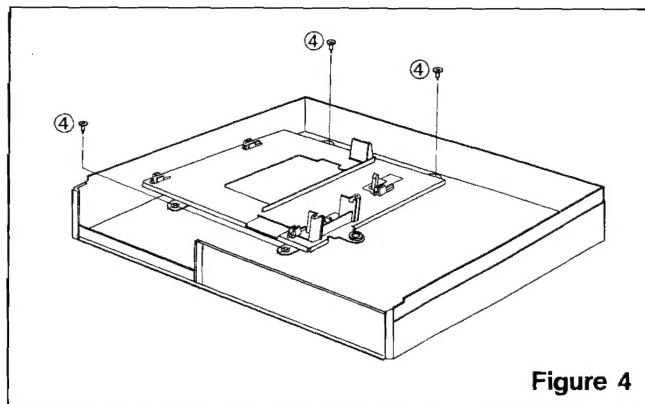


Figure 4

5. To Remove the P.C.B (Figure 5)  
A: After taking off the front panel, (refer to 2) remove 5 screws ⑤  
B: After taking off the bottom cover (refer to 1), remove 5 screws ⑨  
And To remove the Slider Volume, After remove 4 screws ⑥, remove the slider volume knob ⑦

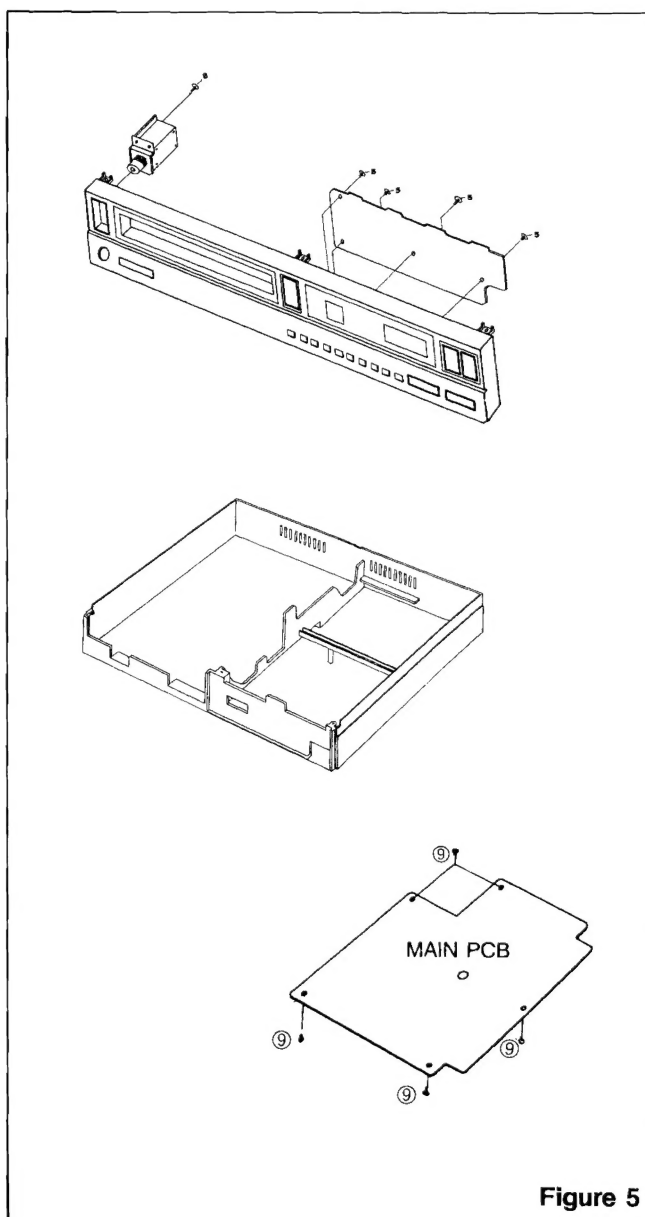


Figure 5

6. To Remove the Power Transformer  
(Figure 6)  
After taking off the Mechanism  
(refer to 4), remove 2 screws ⑦

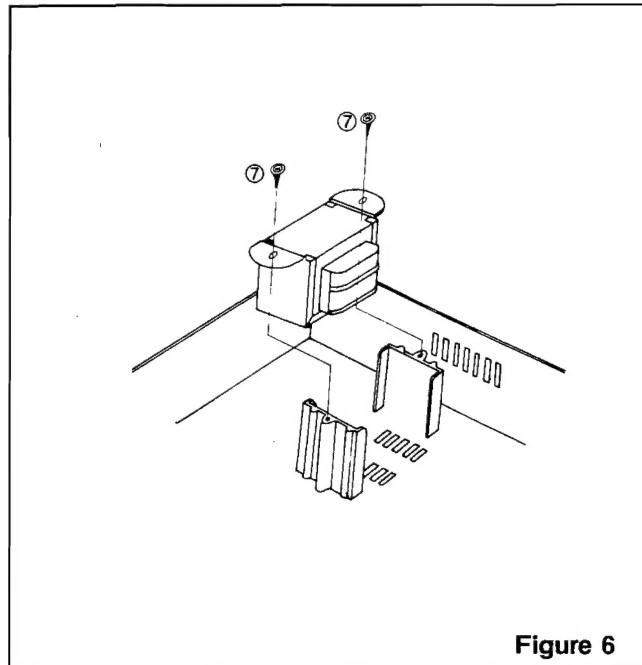


Figure 6

7. To Remove the Head Phone Jack  
(Figure 5)  
After taking off the front panel  
(refer to 2), remove 2 screws ⑧
8. To Remove the Pick up (Figure 7)  
After taking off the Mechanism  
(refer to 4)
- A: To remove the guide shaft,  
remove the 4 screws ⑧
- B: To remove the rack,  
remove the 2 screws ⑨

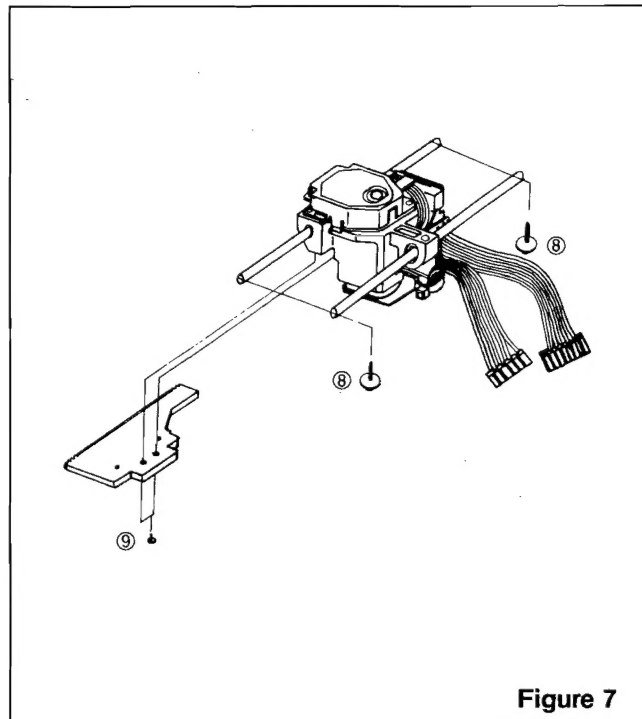
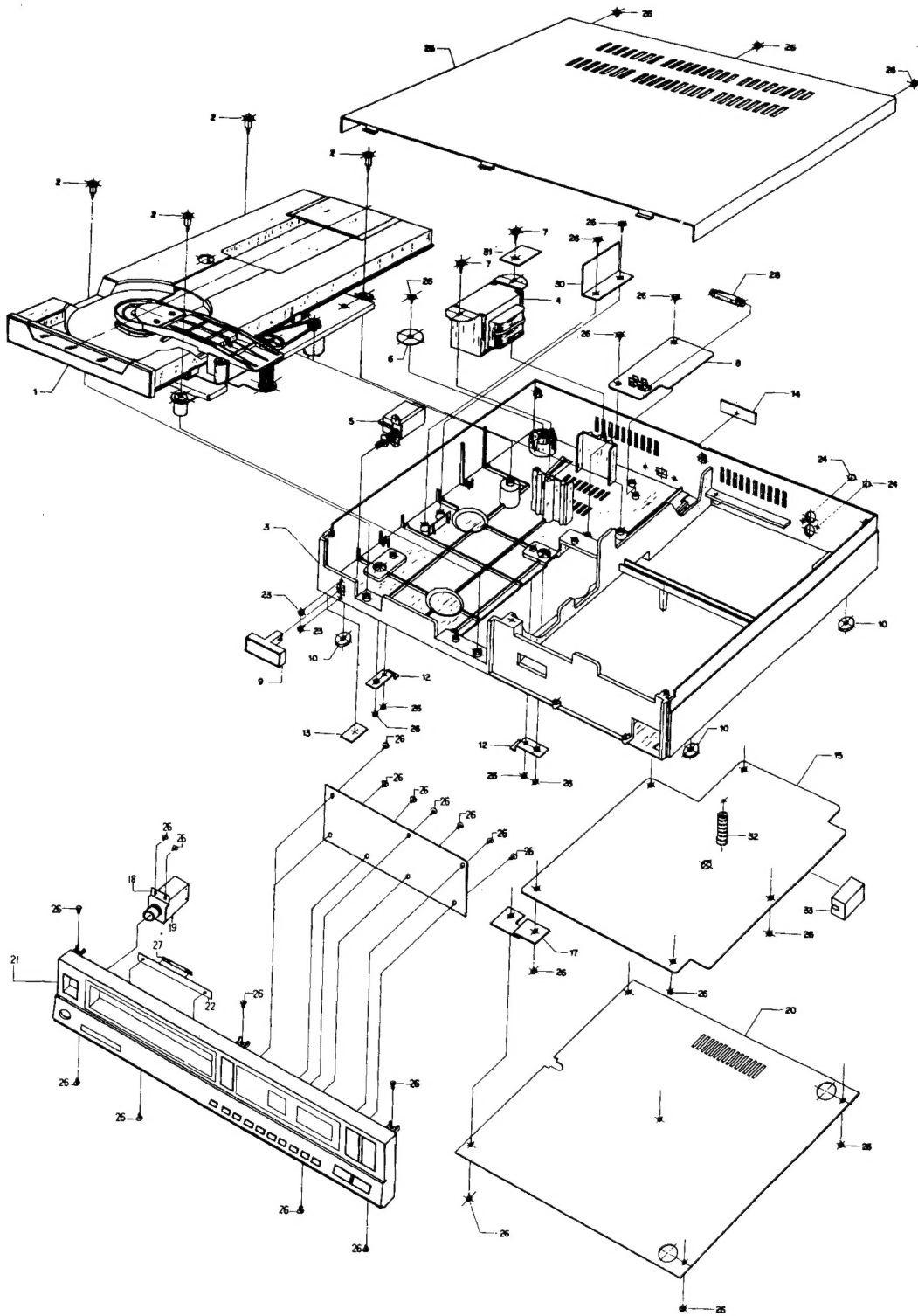


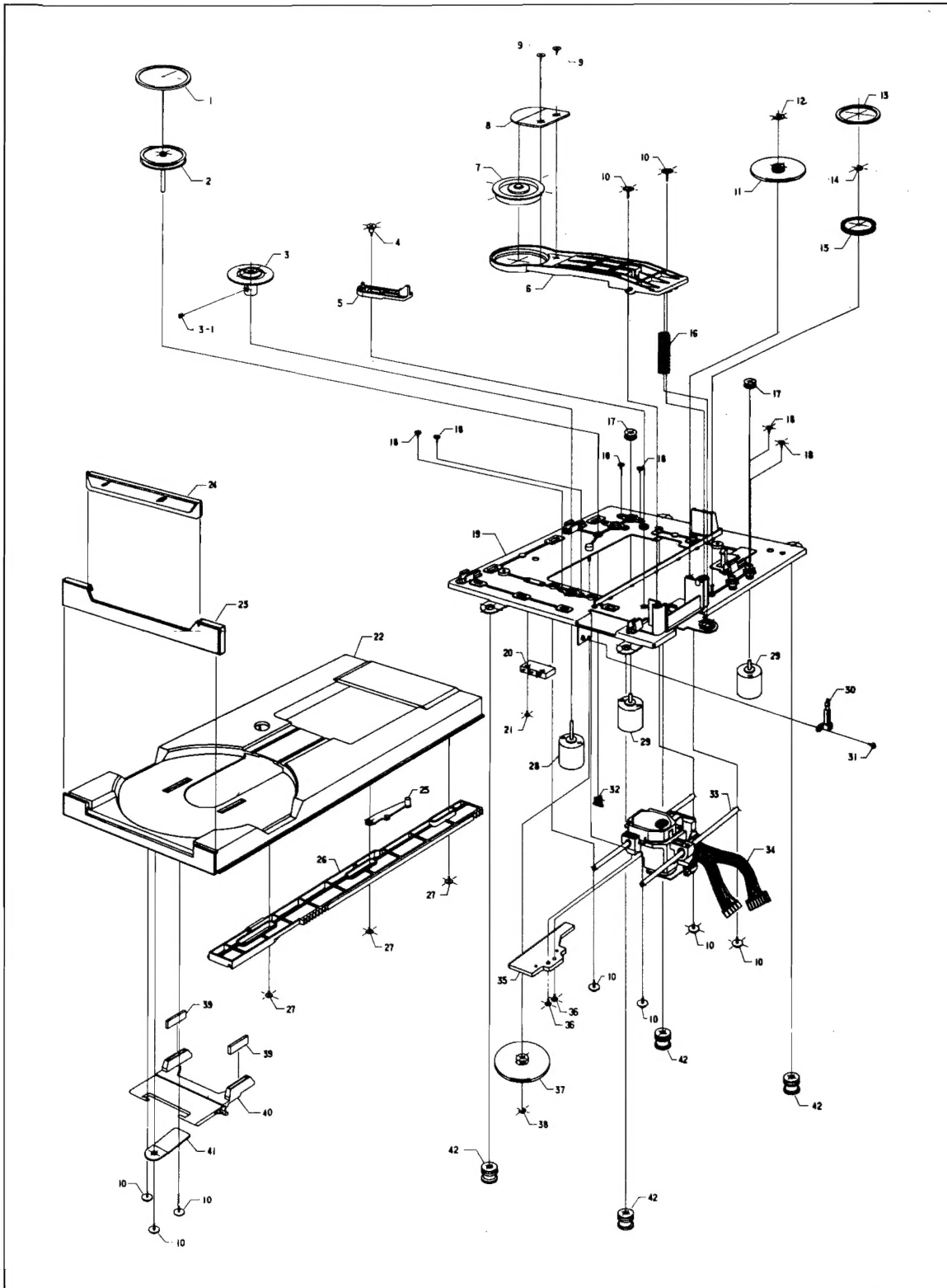
Figure 7

# EXPLODED VIEW—CABINET





# EXPLODED VIEW—MECHANISM



# EXPLODED VIEW PARTS LIST

## CABINET

REF NO	DESCRIPTION	DRW NO.
1	MECHA ASS'Y	
2	SETTING SCREW $\phi 3 \times 13$ , MECHA $\times 4$	M1024
3	FRAME	LF 1001
4	TRANS FORMER	
5	POWER S/W	
6	STOPPER-POWER CORD	SF 1014
7	SCREW TAPPING WPH $3.5 \times 10L$	
	TRANS FORMER $\times 2$	
8	PCB-FUSE	SF 1020
9	POWER KNOB	LF 1003
10	FOOT $\times 4$	S 4017
11		
12	BRACKET MECHA $\times 2$	SF 1012
13	BOTTOM PLATE $\times 4$	SF 1037
14	BACK PLATE	SF 1036
15	PCB-MAIN	SF 1019
16	PCB-PANEL	LF 1013
17	EARTH PLATE	M 1040
18	BRACKET-PHONE JACK	LF 1016
19	HEAD PHONE JACK	
20	COVER BOTTOM	SF 1016
21	FRONT PANEL	LF 1002
22	PCB-LAMP	SF 1022
23	SCREW-MACHINE PHM $3 \times 6$	
	POWER S/W $\times 2$	
24	SCREW-TAPPING PH $\phi 3 \times 10$	
	RCA JACK $\times 2$	
25	COVER-UPPER	LF 1023
26	SCREW-TAPPING PH $\phi 3 \times 8$	
	COVER-UPPER $\times 3$	
	PCB-FUSE $\times 2$	
	STOPPER-POWER CORD $\times 1$	
	BRACKET MECHA $\times 2$	
	PCB-PANEL $\times 4$	
	PCB-MAIN $\times 5$	
	BRACKET PHONE JACK $\times 2$	
	COVER-BOTTOM $\times 5$ BRACKET "B" $\times 2$	
	FRONT PANEL $\times 7$	
27	LAMP TUBE	SF 1026
28	FUSE	
30	BRACKET "B"	SF 1047
31	BRACKET "A"	SF 1046
32	GROUND SPRING	SF 1045
33	SPACER-PCB	SF 1041

## MECHANISM PART LIST

REF NO	DESCRIPTION	DRW NO
1	BELT "B"	M 1029
2	PULLEY 1st (TRACK SERVO)	M 1003
3	TURN TABLE	M 1013
3-1	SETTING BOLT	AT 0204
4	SLIDER SCREW	M 1022
5	SLIDER	M 1011
6	FLAPPER	M 1015
7	DISC CLAMPER	M 1014
8	CLAMPING PLATE	M 1012
9	SCREW-TAP (BH) T3 $\times 7L$	
10	SCREW-TAP (WPH) T3 $\times 8L$	
11	WHEEL-2nd (TRAY SERVO)	M 1008
12	E-RING $\phi 2.0$	
13	BELT "A"	M 1025
14	E-RING $\phi 1.5$	
15	WHEEL-1st (TRAY SERVO)	M 1007
16	SPRING-FLAPPER	M 1032
17	PULLEY-MOTOR	M 1002
18	SCREW-BH M2 $\times 4.5L$	
19	BASE ASS'Y	M 1001
20	MICRO SWITCH (AH 2502)	SANKYO
21	SCREW-TAP (PH) T2.2 $\times 12L$	
22	TRAY	M1017
23	COVER-TRAY	H 22004
24	SCREW-PH M3 $\times 6$	
25	LEVER-CLUTCH	M 1010
26	ACTUATING RACK	M 1009
27	SCREW-TAP (BH) T2.2 $\times 6L$	
28	MOTOR-SERVO (NBS6B-K)	SANKYO
29	MOTOR-SPINDLE (NBS4R-K)	SANKYO
30	LEAF SWITCH (MSW 1585)	MIC ELEC
31	SCREW-PH M2.6 $\times 0.45 \times 6L$	
32	WHEEL-2nd	M 1006
33	GUIDE SHAFT	M 1030
34	PICK UP (KSS-152A)	SONY
35	RACK (TRACK)	CD 4200
36	SCREW-TAPPING PH $\phi 2 \times 6L$	
37	WHEEL-3rd (TRACK SERVO)	M 1004
38	E-RING $\phi 2.0$	
39	PROTECTOR DISC	M 1018
40	DISC LIFTER	M 1016
41	SPRING PLATE	M 1020
42	INSULATOR	M 1021

# ALIGNMENT AND ADJUSTMENT

When you happen to do either (1), or (2) be sure to perform the adjustments 1-6.

- 1) Disassembly of the unit mechanism and replacement of parts.
- 2) Replacement of parts of the pick up assembly.

## ••PRESETTING

Adjustment	Circuit No.	Preset Position
RF GAIN	VR 101	Center
FE OFFSET	VR 103	Center
TE OFFSET	VR 102	Center
FE GAIN	VR 104	Center
TE GAIN	VR 105	Center
PLL	VR 201	Center

••Adjustment should be made in the following sequence.

### 1. RF GAIN Adjustment.

Don't perform this adjustment except when the parts of R102, R103, C102, C103, C104, PICK UP, IC 101, have been changed.

#### 1) Instrument to be used

•Oscilloscope

#### 2) Adjusting procedure (Figure 1)

- Connect the oscilloscope to TP5 (RF) and TP5 (GND)
- Load a disc in the player and set the player to play mode.
- Adjust VR101 so that oscilloscope indicate the figure shown in Figure 1.

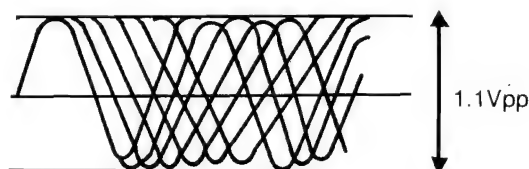
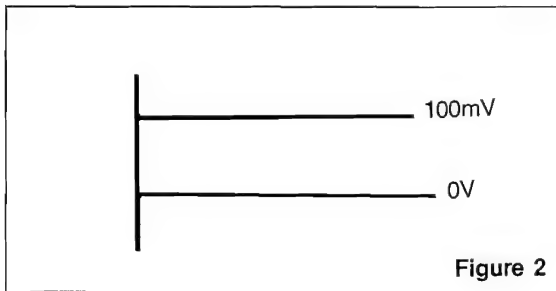


Figure 1

## 2. FE OFFSET Adjustment.

Don't perform this adjustment except when the parts of VR103, IC101 PICK UP have changed.

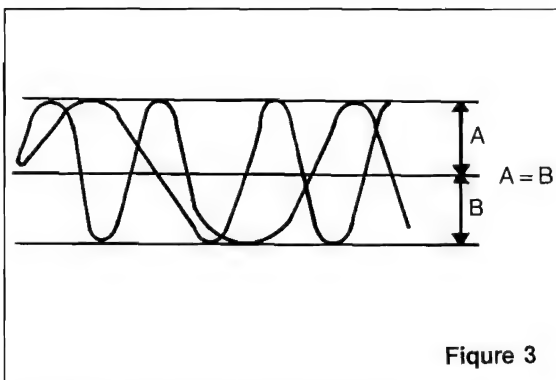
- 1) Instrument to be used.
  - Oscilloscope
- 2) Adjusting Procedure (Figure 2)
  - Connect the Oscilloscope to TP3 (FE) and TP5 (GND).
  - Load a disc in the player, and set the player to STOP mode.
  - Adjust VR103 so that oscilloscope indicate the figure shown in Figure 2.



## 3. TE OFFSET Adjustment.

Don't perform this adjustment except when the parts of VR102, IC101, PICK UP.

- 1) Instrument to be used.
  - Oscilloscope
- 2) Adjusting Procedure.
  - Connect the oscilloscope to TP4 (TE) and TP5 (GND).
  - Return to Counterclockwise VR105
  - Load a disc in the player, and set the player to play mode.
  - Adjust VR102 so that oscilloscope indicate the figure shown in Figure 3.



- presetting to VR105, after adjusted.

## 4. FE GAIN Adjustment.

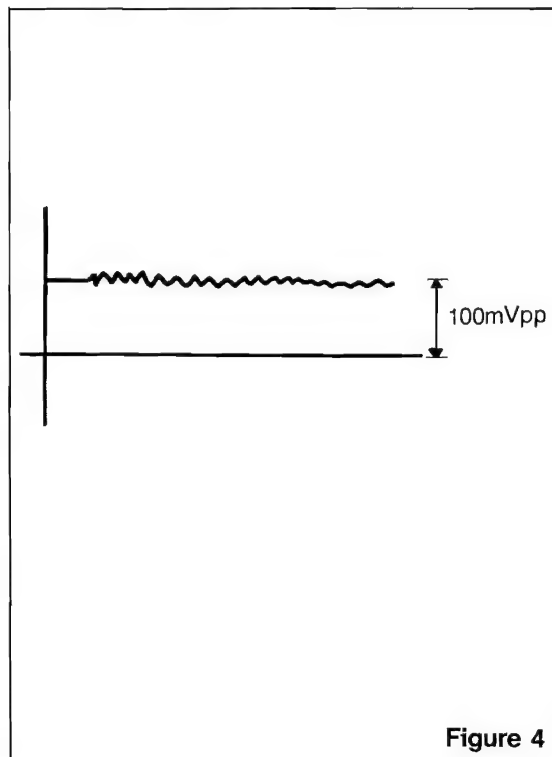
Don't perform this adjustment except when the parts of VR104, IC1, PICK UP have been changed.

- 1) Instrument to be used.
  - Oscilloscope
- 2) Adjusting Procedure
  - Connect the oscilloscope to TP3 (FE) and TP5 (GND).
  - Load a disc in the player, and set the player to play mode.
  - Adjust VR104 so that oscilloscope indicate the figure shown in Figure 4.

## 5. TE GAIN Adjustment.

Don't perform this adjustment except when the parts of VR105, IC101 PICK UP have been change.

- 1) Instrument to be used.
  - Oscilloscope
- 2) Adjusting Procedure
  - Connect the oscilloscope to TP3 TP4 and TP5 (GND).
  - Load a disc in the player, and set the player to play mode.
  - Adjust VR105 so that oscilloscope indicate the figure shown in Figure 5.



## 6. Adjustment PLL.

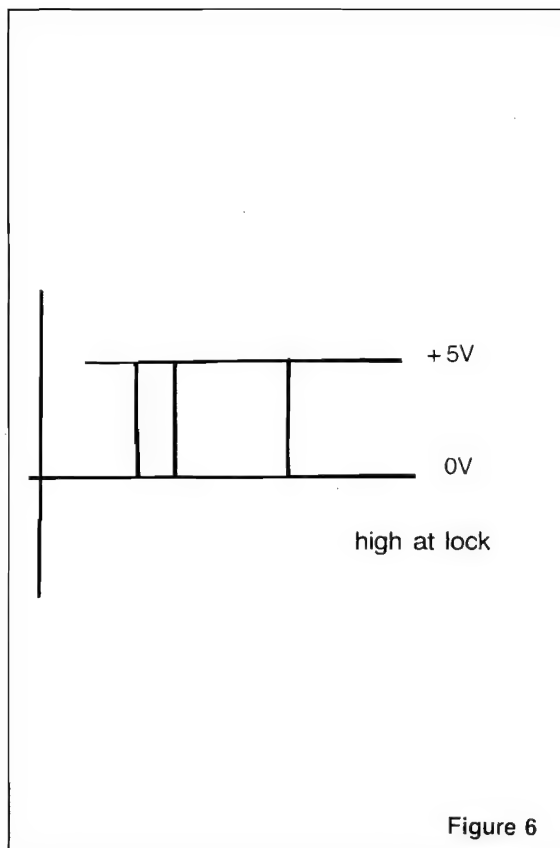
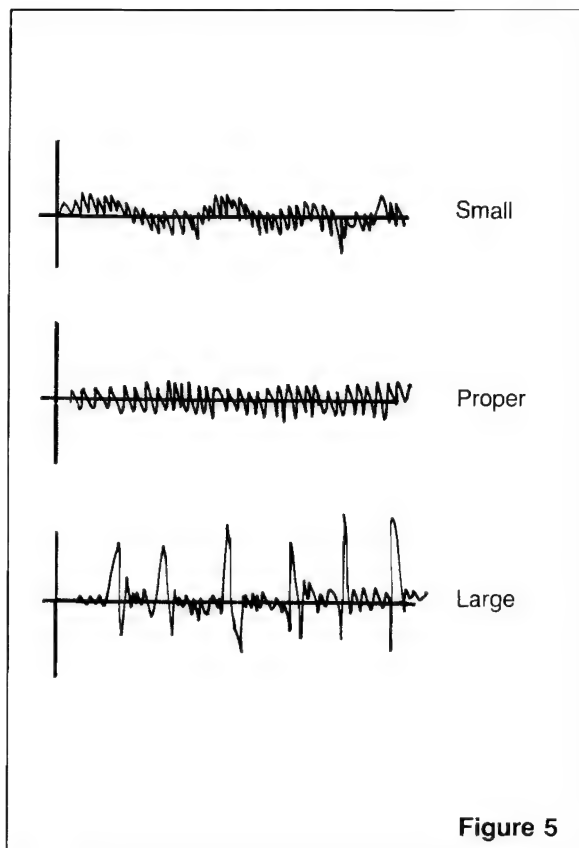
Only perform this adjustment when IC201, IC401, VR201, C220, R218 are replaced.

1) Instrument to be used.

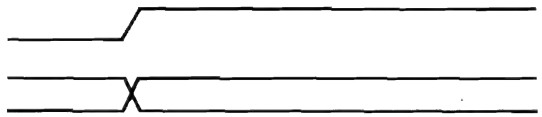
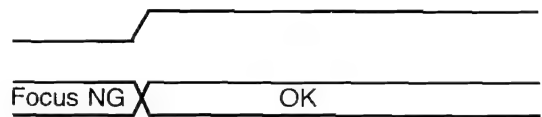
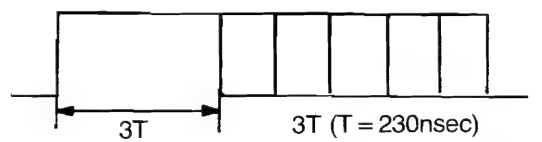
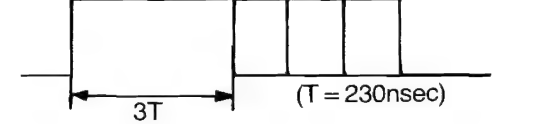
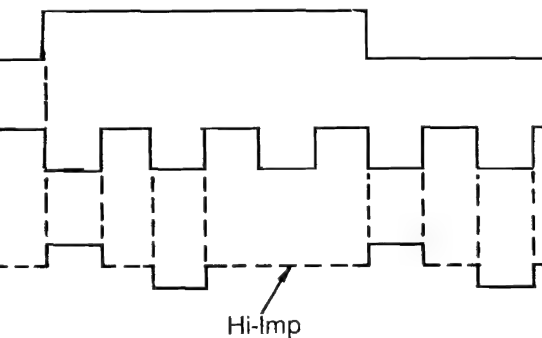
- Oscilloscope



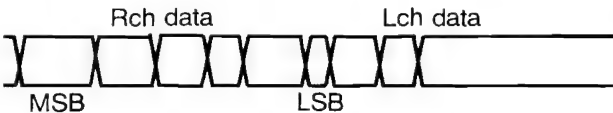
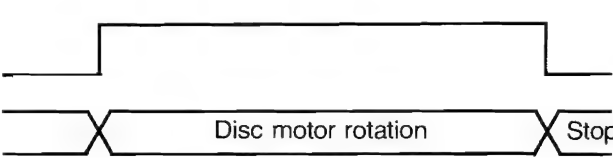
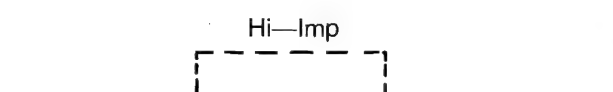
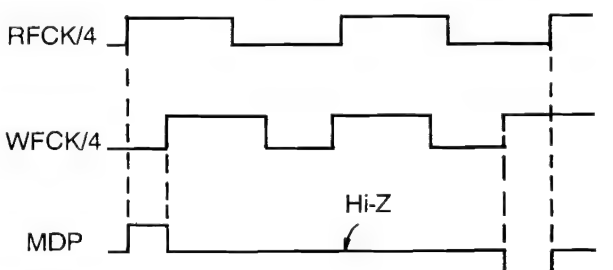
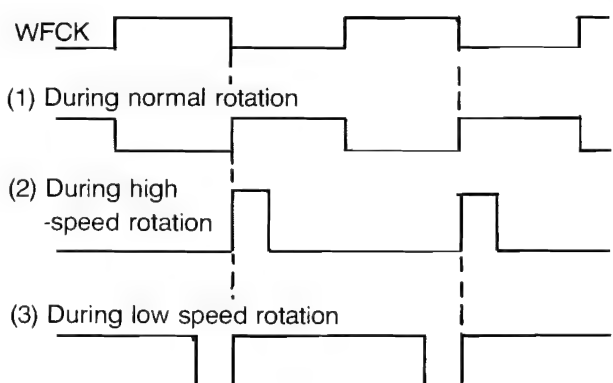
2) Adjusting Procedure

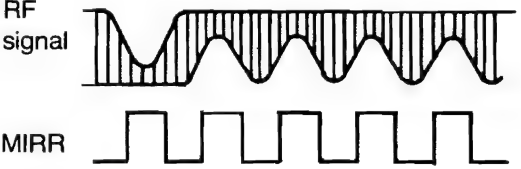
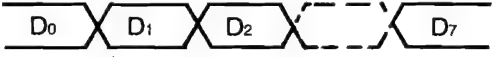

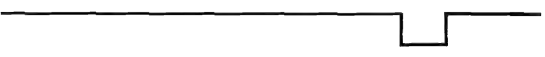
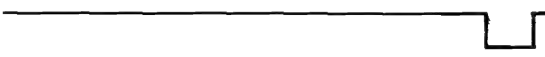
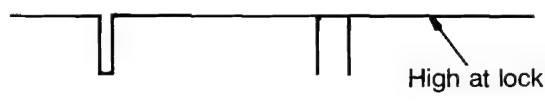
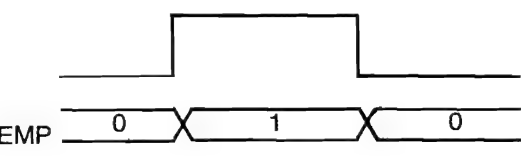

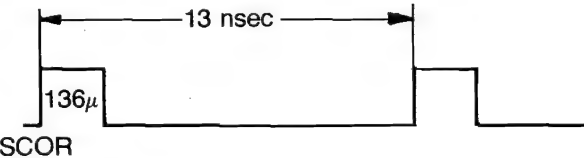

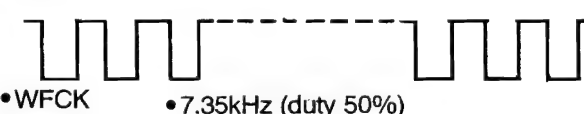
- Connect the oscilloscope to TP6(GFS) and TP5 (GND)
- Load a disc in the player, and set the player to play mode.
- Adjust VR201 so that oscilloscope indicate the figure shown in Figure 6.



# DESCRIPTION OF INTERFACE

Signal	Timing and level	Contents
OPEN SW CLOSE SW SLED SW		TRAY OPEN TRAY CLOSE Inner SLED
FOK		FOK sign
EFM		EFM comparator signal
ASY		EFM buffer sign
EFM PLCK PDO		EFM : EFM signal  PLCK: PLL clock about 4.3 MHz  PDO: PLL servo phase differentiation detection output

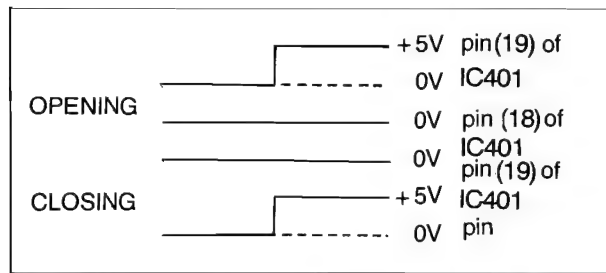
Signal	Timing and level	Contents
LRCK		LRCK: L, R select signal
WDCK		WDCK: Clock for timing generation
DA01 DA16		DATA: 16 bit Parallel audio output (2'S complement) C210: Clock for timing generation
MON		MON: MOTOR ON
FSW		FSW: FREQUENCY SW for Disc Motor servo
MDP		MDP: Rough control in CLV-S mode and phase control signal in CLV-P mode
MDS		MDS: Speed control signal in CLV-P mode

Signal	Timing and level	Contents
MIRR		Mirror output
DATA		Data transmission
CLK		Data transmission clock
XLT		Data transmission latch
DIRC		Servo control signal used in 1-track JUMP (Refer to servo command code lists)
GFS		GFS: When the data is correctly read with the disc motor rotating normally, becomes high in lock mode.
EMP		Audio emphasis control signal
MUTG		Mute correct signal for audio signal of signal processing LSI
SCOR		SCOR: Sub-code synchro signal
SUBQ		SUBQ: Sub-code Qch signal
WFCK		WFCK: Write Frame clock in signal processing LSI



# TROUBLE SHOOTING

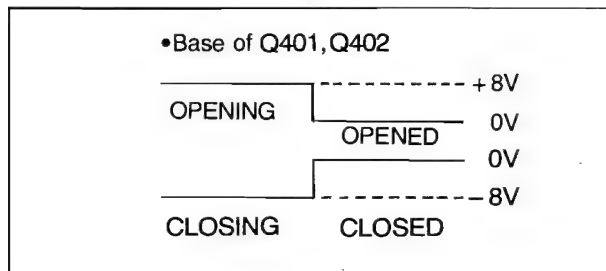
## (1) Does the TRAY Operated?



NO

Defective OPEN/CLOSE switch and IC401

YES



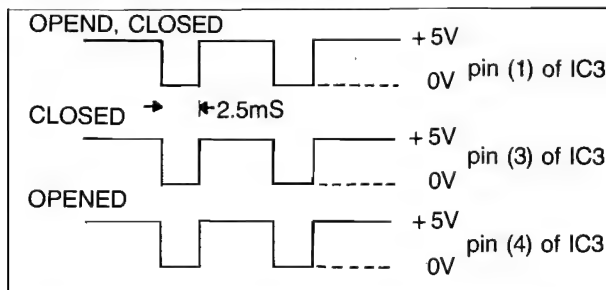
NO

Defective Q401, Q402, IC404

YES

Defective TRAY MOTOR and CP104

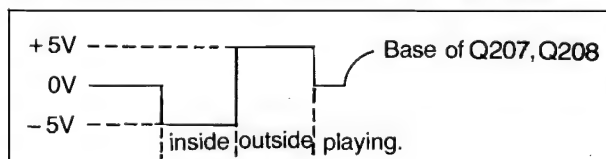
### •Defective OPEN/CLOSE SWITCH



NO

Defective D401, D402, D403, and CP106

## (2) Does the PICK UP return to Inside when closed?



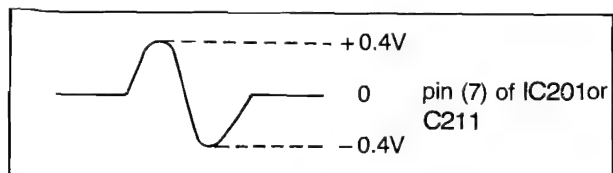
NO

Defective pin (14), (15) of IC201 and SLED switch

YES

Defective motor and CP103

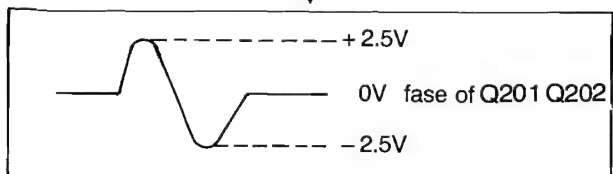
(3) Does focus work?



NO

Defective pin (7) and IC201 or C211

YES



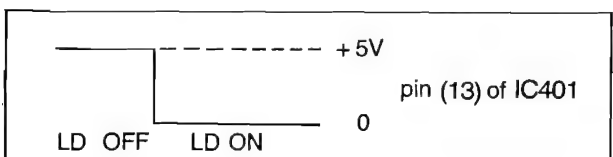
NO

Defective pin (5), (6) IC201, or Q201 Q202

YES

Defective CP102, PICK-UP

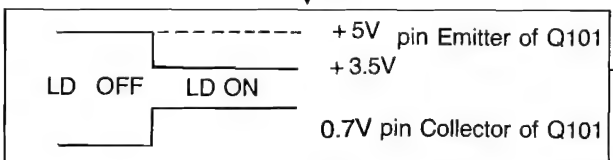
(4) Is laser diode lighted?



NO

Defective OPEN/CLOSE and SLED switch.

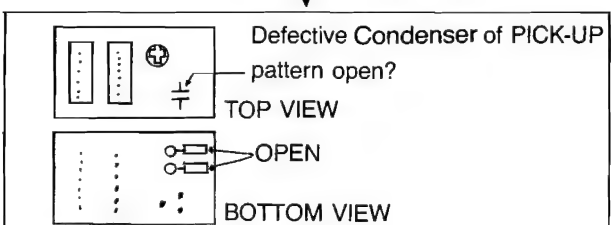
YES



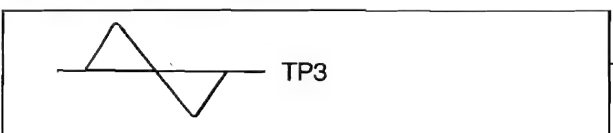
NO

Defective pin (5), (6) of IC101 periphery Q101.

YES



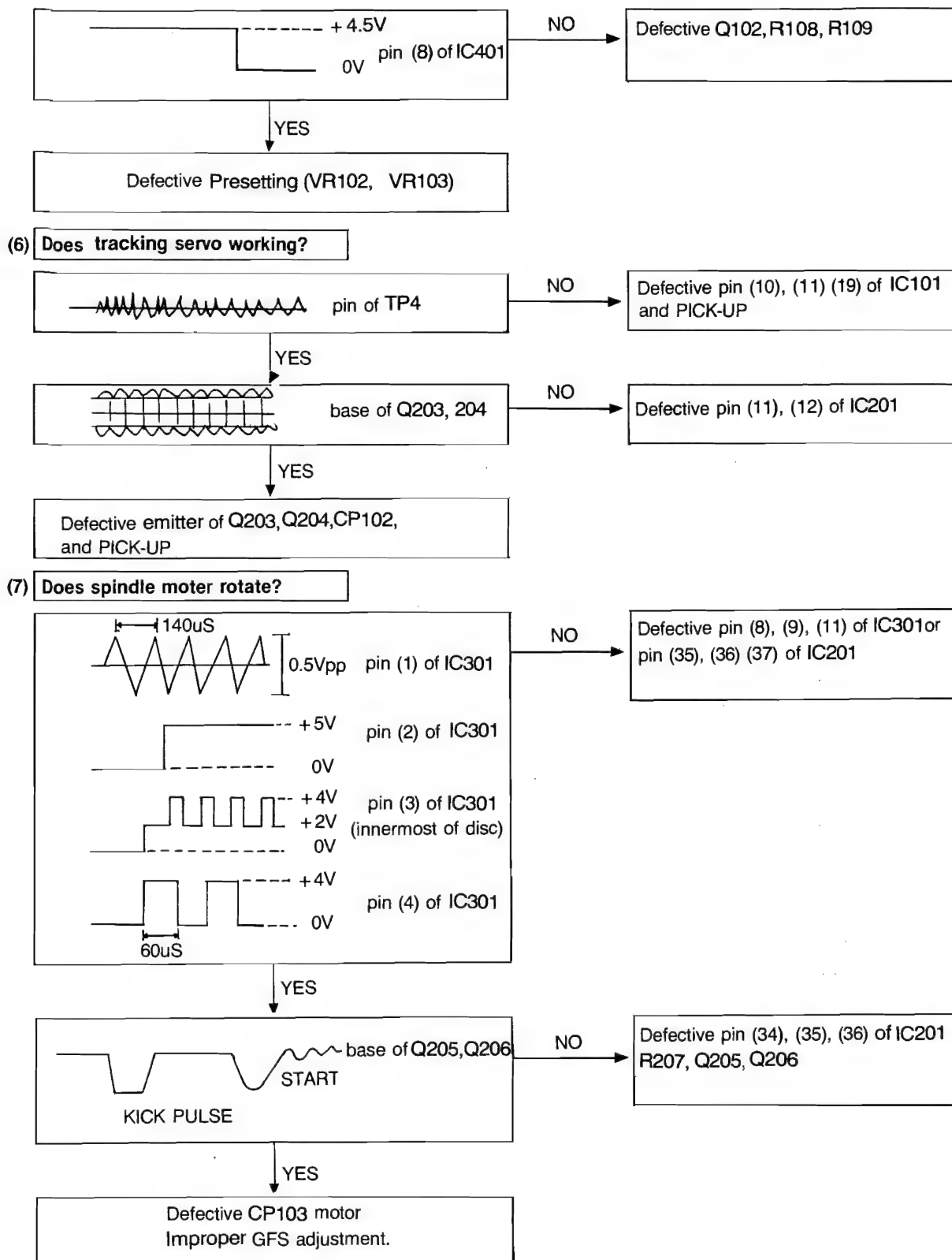
(5) Output Focus error (FE)?



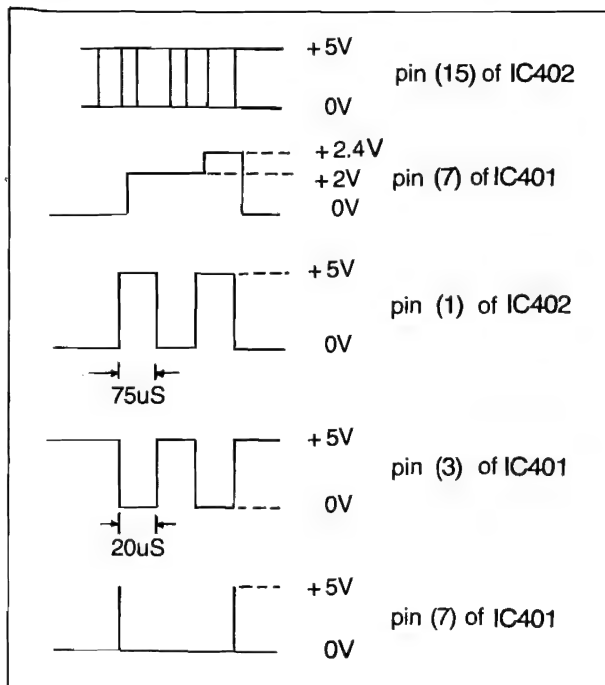
NO

Defective CP101 or pin (7), (8) of IC101

YES



(8) Does the LEAD IN? (total track display)



NO

Defective pin (7), (39) of IC401  
pin (1), (7) of IC401

YES

Defective C222, C223, C221, R215, R216, R217, R219, R220, Q209, • Improper PLL adjustment •

Defective pin (60), (61), (80) of IC301

(9) Output audio?

pin (9), (10), (11), of IC560 applied 88.2kHz

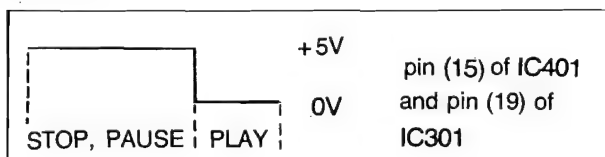
NO

Defective IC560 MUTE circuit.

YES

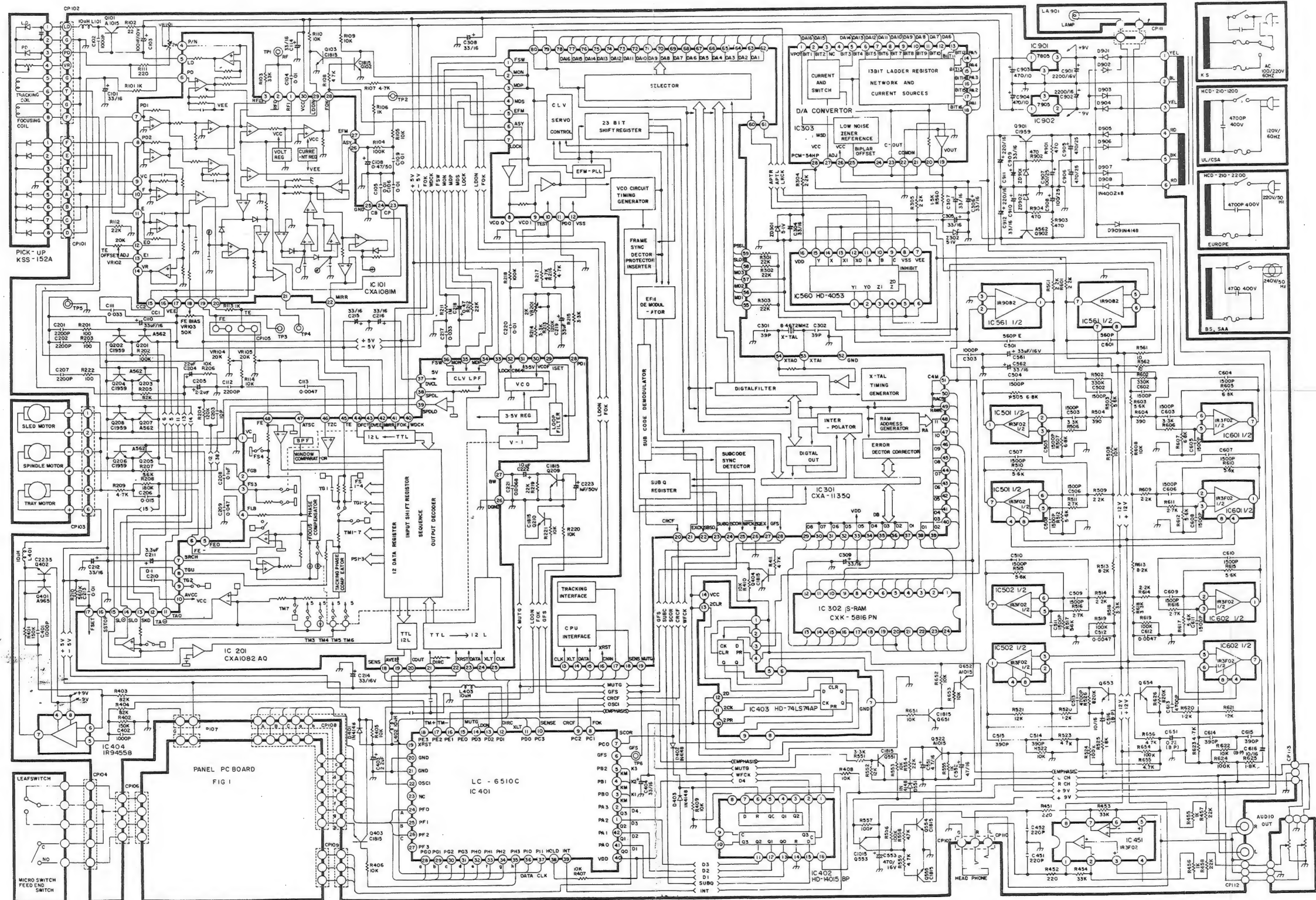
pin (1), (7) of IC561 applied signal

• MUTE

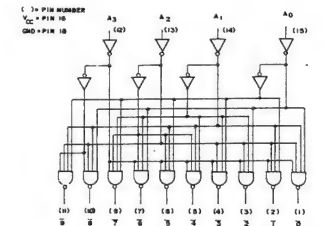




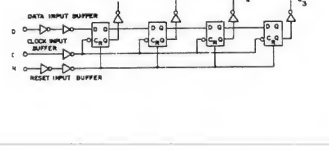
# SCHEMATIC DIAGRAM 1



• 14053B (IC560)



• 14015B (IC402)

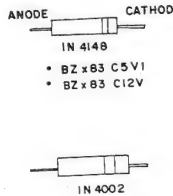


• TRANSISTOR

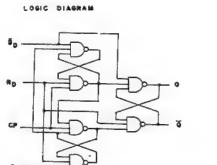


ECB  
A562  
A1015  
C1815  
C1959

• DIODES

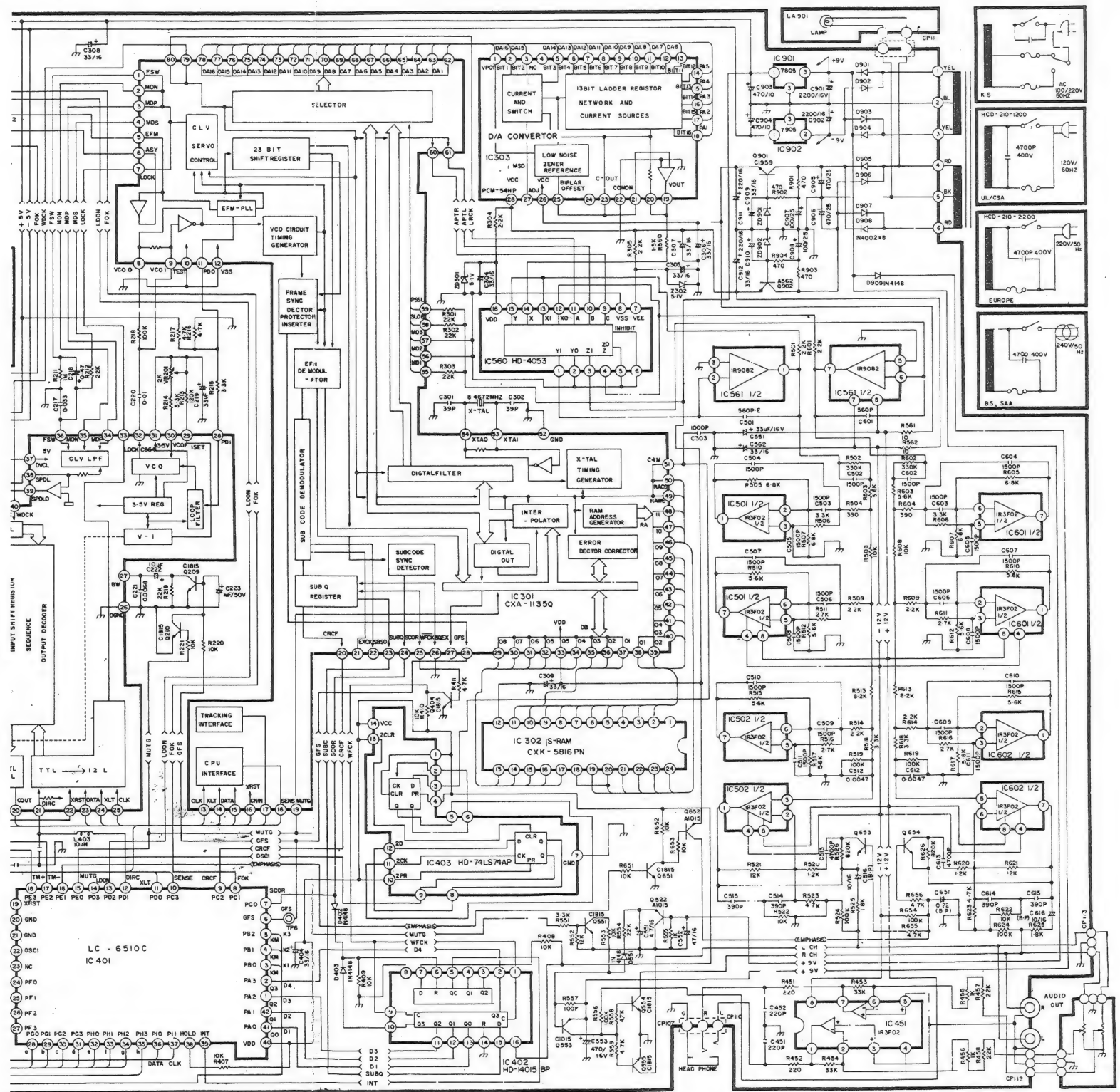


• 74LS74 (IC403)



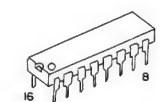
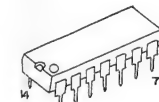
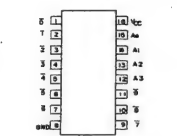
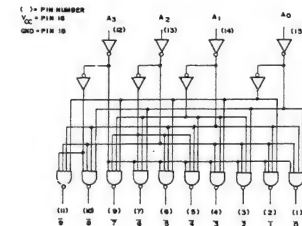


# SCHEMATIC DIAGRAM 1



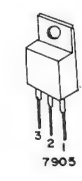
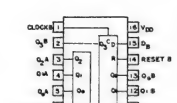
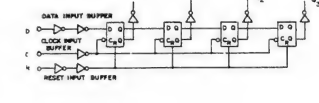
## INTEGRATED CIRCUITS

• 14053B (IC560)



- 74LS45
- LB 1216
- HD 14053B
- HD 14015B

• 14015B (IC402)



• TRANSISTOR

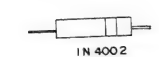


- ECB
- A 562
- A 1015
- C 1815
- C 1959

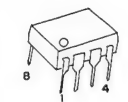
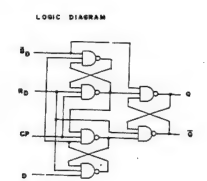
• DIODES



- BZ x 83 C5V1
- BZ x 83 C12V



• 74LS74 (IC403)



- 1R 94158
- 1R 90b2
- 1R 3F02



SCHEMATIC DIAGRAM 2

NOTE: RESISTANCE VALUES ARE INDICATED IN OHMS UNLESS OTHERWISE SPECIFIED (K=1000 OHMS)

SWITCH (KEY)					
REFERENCE NO.	NAME	POSITION			
S901	POWER SW	OFF	S810	LAST	OFF
S801	INDEX	OFF	S811	FF	OFF
S802	REMAIN	OFF	S812	FR	OFF
S803	CALL	OFF	S813	STOP	OFF
S804	PROGRAM	OFF	S814	OPEN/CLOSE	OFF
S805	REPEAT	OFF	S815	PLAY/PAUSE	OFF
S806	CLEAR	OFF	S816	SLED SW	ON
S807	NEXT	OFF	S817	OPEN SW	OFF
S808	5	OFF	S818	CLOSE SW	ON
S809	10	OFF			

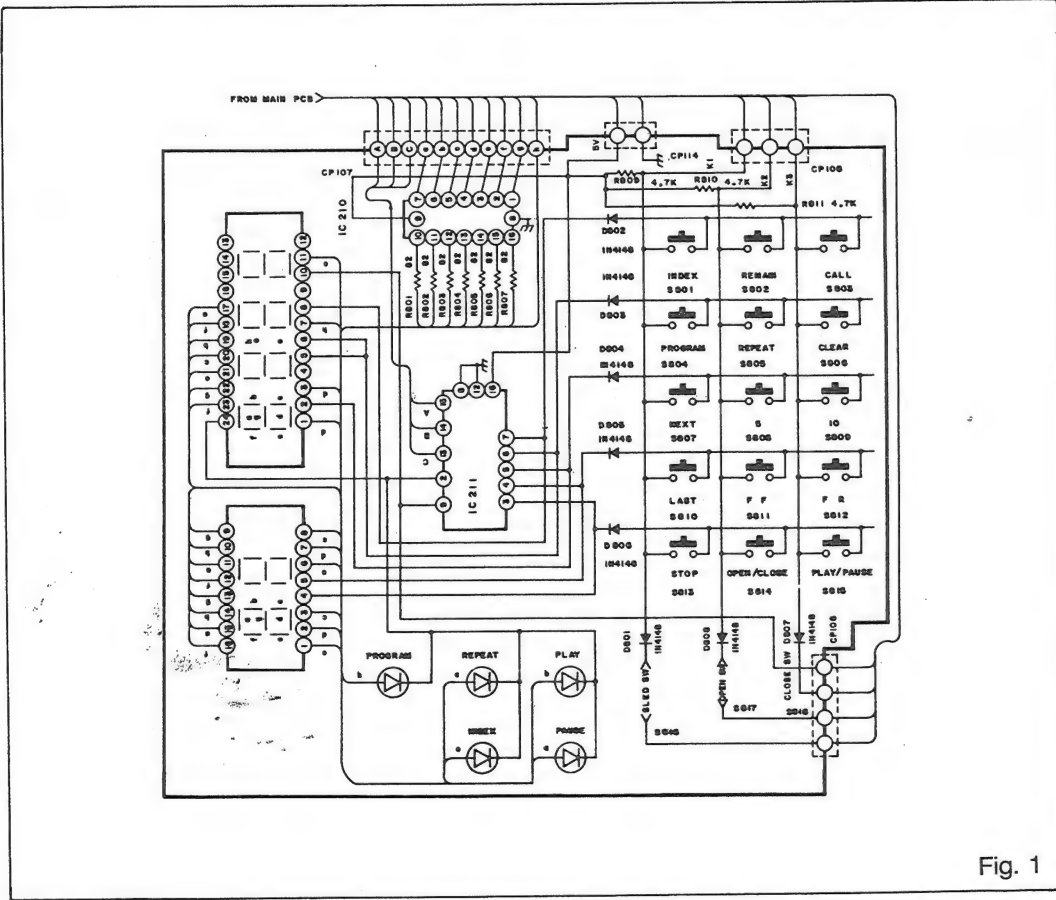
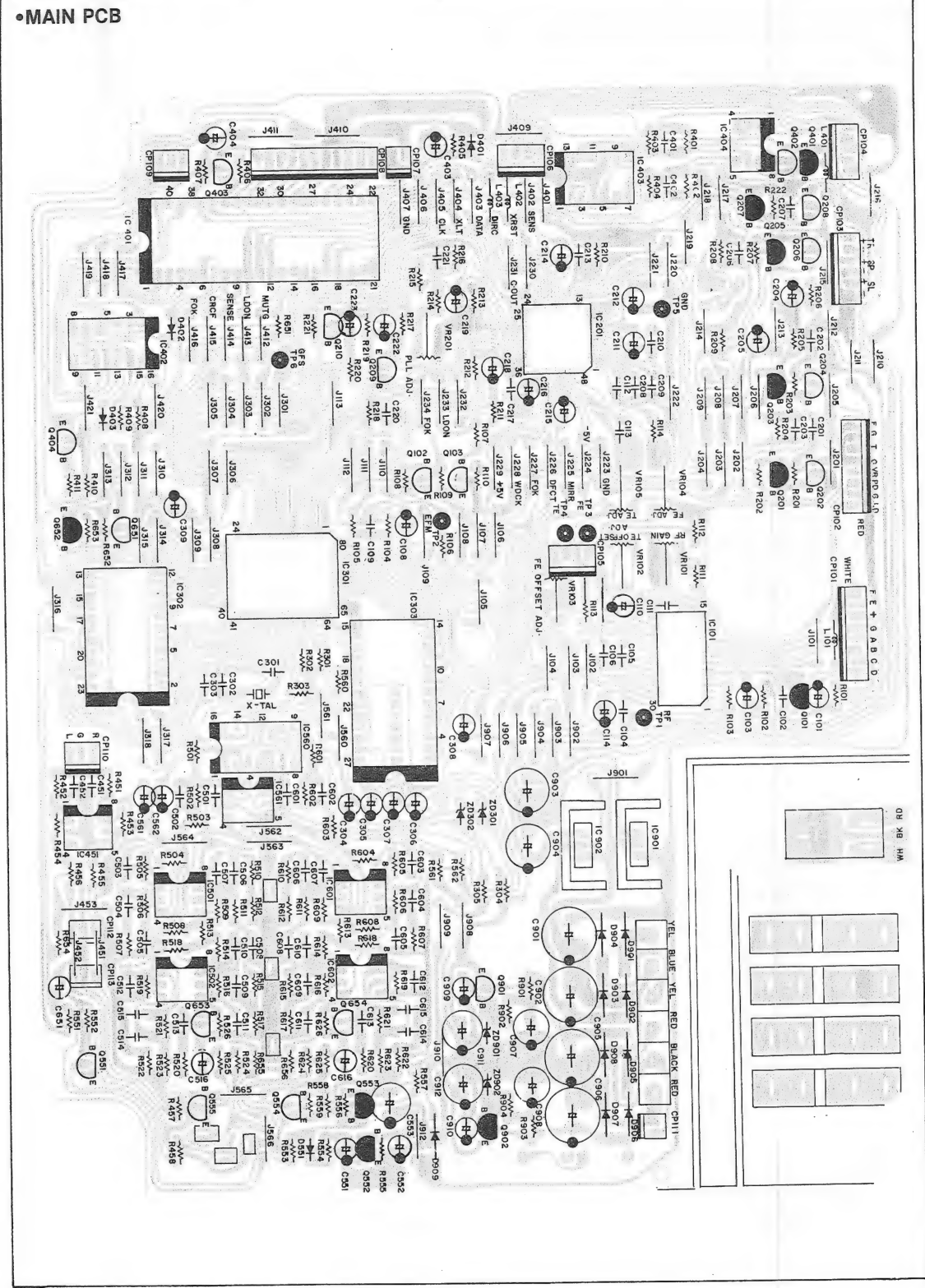


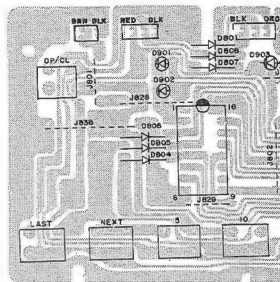
Fig. 1

P.C BOARD



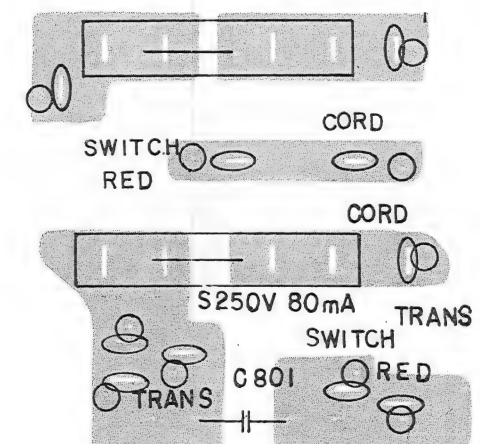
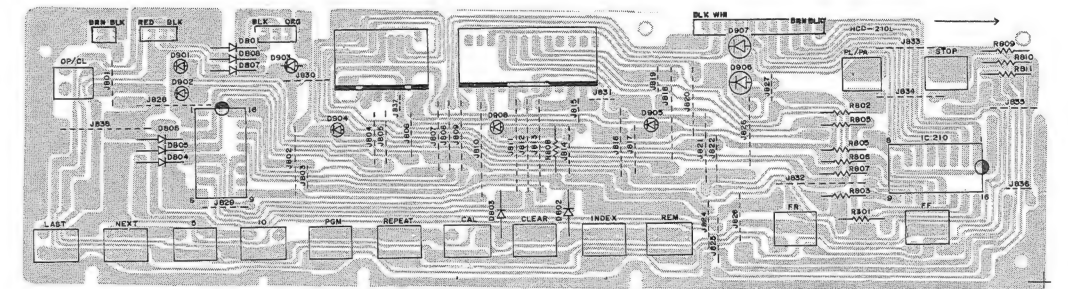
P.C BOARD

•PANEL PCB



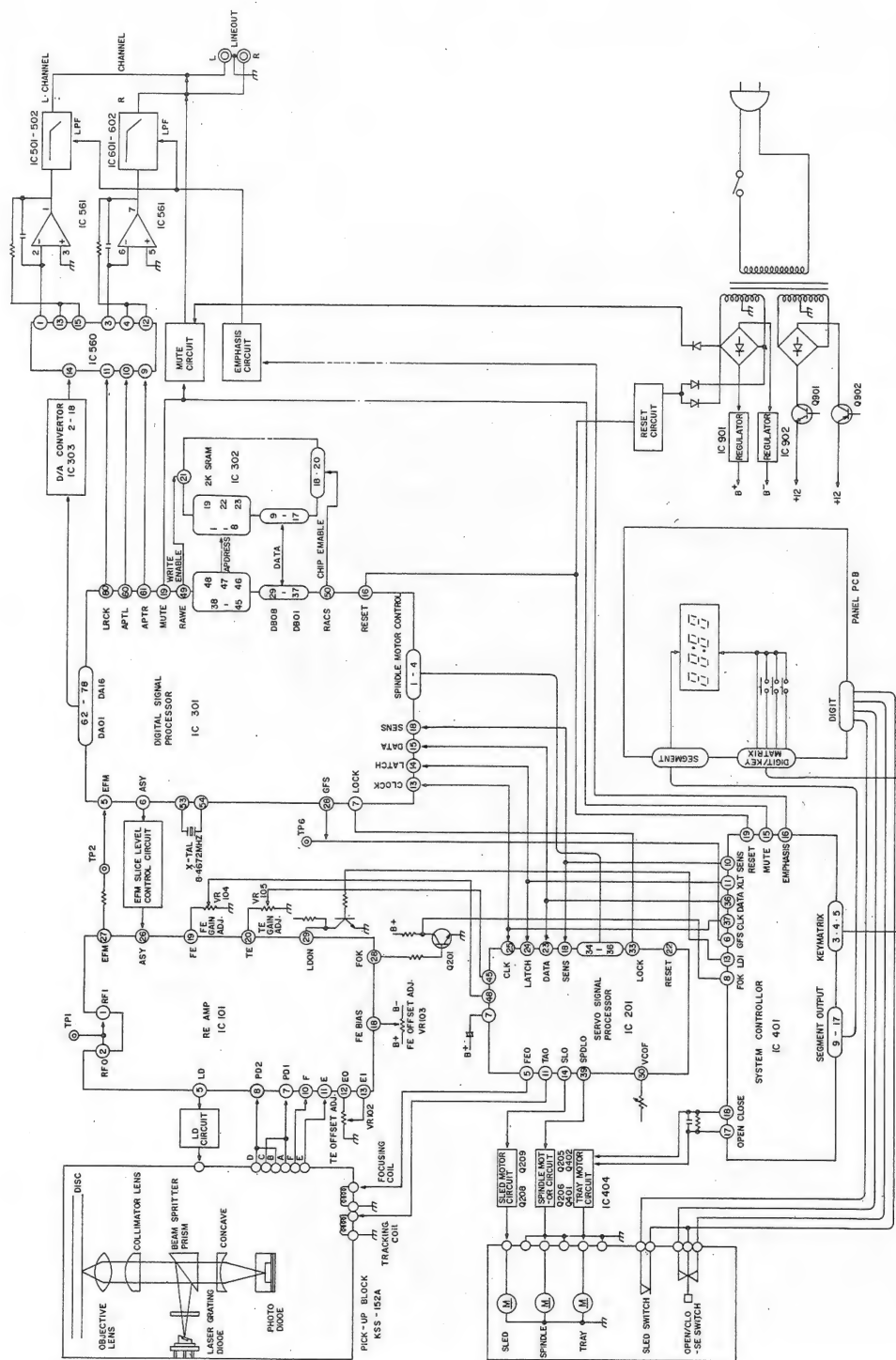
• FUSE PCB



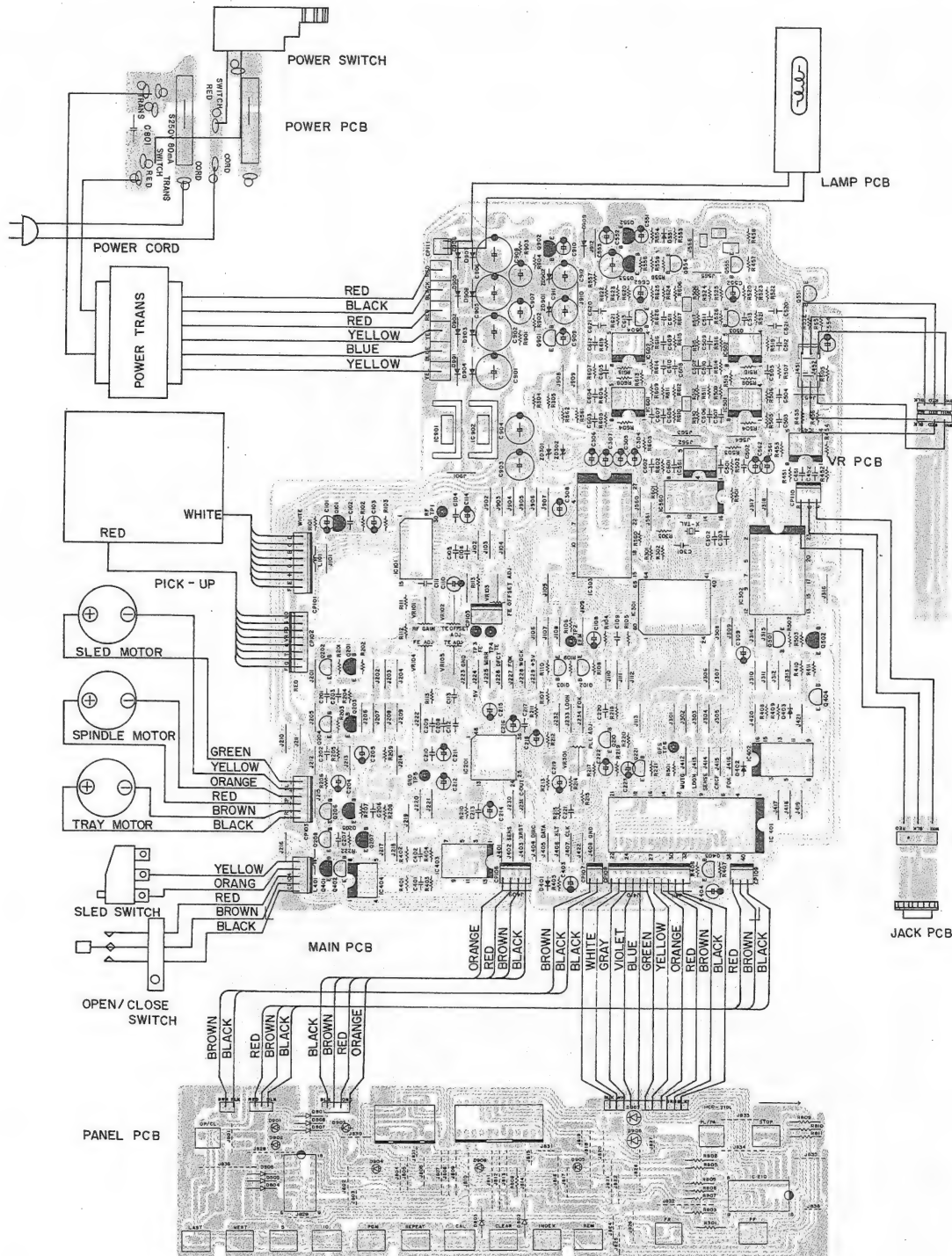




# BLOCK DIAGRAM



# WIRING DIAGRAM



# ELECTRICAL PARTS LIST

## MAIN PCB

REF NO	RESISTORS	%	CODE NO	REF NO	RESISTORS	%	CODE NO
R101	CARBON 1K 1/6W	5%	RI1001C7	R411	CARBON 150K 1/6W	5%	RI4701C4
R102	CARBON 22K 1/6W	5%	RI0220C5	R451	CARBON 220 1/6 W	5%	RI2200C4
R103	CARBON 33K 1/6W	5%	RI3302C1	R452	CARBON 220 1/6 W	5%	RI2200C4
R104	CARBON 100K 1/6W	5%	RI1003C3	R453	CARBON 33K 1/6 W	5%	RI3302C1
R105	CARBON 10K 1/6W	5%	RI1002C5	R454	CARBON 33K 1/6 W	5%	RI3302C1
R106	CARBON 1K 1/6W	5%	RI1001C7	R455	CARBON 1K 1/6 W	5%	RI1001C7
R107	CARBON 4.7K 1/6W	5%	RI4701C4	R456	CARBON 1K 1/6 W	5%	RI1001C7
R108	CARBON 47K 1/6W	5%	RI4702C2	R457	CARBON 22K 1/6 W	5%	RI2202C0
R109	CARBON 10K 1/6W	5%	RI1002C5	R458	CARBON 22K 1/6 W	5%	RI2202C0
R110	CARBON 10K 1/6W	5%	RI1002C5	R501	CARBON 2.2K 1/6W	5%	RI2201C2
R111	CARBON 220 1/6W	5%	RI2200C4	R502	CARBON 330K 1/6W	5%	RI3303C8
R112	CARBON 22K 1/6W	5%	RI2202C0	R503	CARBON 5.6K 1/6 W	5%	RI5601C8
R113	CARBON 1K 1/6W	5%	RI1001C7	R504	CARBON 390 1/6 W	5%	RI3900C5
R114	CARBON 10K 1/6W	5%	RI1002C5	R505	CARBON 6.8K 1/6W	5%	RI6801C3
R201	N.C	5%		R506	CARBON 3.3K 1/6W	5%	RI3301C3
R202	CARBON 100K 1/6W	5%	RI1003C3	R507	CARBON 6.8K 1/6 W	5%	RI6801C3
R203	N.C	5%		R508	CARBON 10K 1/6 W	5%	RI1002C5
R204	CARBON 120K 1/6W	5%	RI1203C0	R509	CARBON 2.2K 1/6 W	5%	RI2201C2
R205	CARBON 82K 1/6W	5%	RI8202C6	R510	CARBON 5.6K 1/6 W	5%	RI5601C8
R206	CARBON 10K 1/6W	5%	RI1002C5	R511	CARBON 2.7K 1/6 W	5%	RI2701C8
R207	CARBON 56K 1/6W	5%	RI25602C6	R512	CARBON 5.6K 1/6 W	5%	RI5601C8
R208	CARBON 180K 1/6W	5%	RI1803C0	R513	CARBON 8.2K 1/6 W	5%	RI8201C8
R209	CARBON 4.7K 1/6W	5%	RI4701C4	R514	CARBON 2.2K 1/6 W	5%	RI2201C2
R210	CARBON 560K 1/6W	5%	RI5603C4	R515	CARBON 5.6K 1/6 W	5%	RI5601C8
R211	CARBON 1M 1/6W	5%	RI1004C1	R516	CARBON 2.7K 1/6 W	5%	RI2701C8
R212	CARBON 22K 1/6W	5%	RI2202C0	R517	CARBON 5.6K 1/6 W	5%	RI5601C8
R213	CARBON 120K 1/6W	5%	RI1203C0	R518	CARBON 3.3K 1/6 W	5%	RI3301C3
R214	CARBON 3.3K 1/6W	5%	RI3301C3	R519	CARBON 100K 1/6 W	5%	RI1003C3
R215	CARBON 3.3K 1/6W	5%	RI3301C3	R520	CARBON 1.2K 1/6 W	5%	RI1201C4
R216	CARBON 4.7K 1/6W	5%	RI4701C4	R521	CARBON 12K 1/6 W	5%	RI1202C2
R217	CARBON 4.7K 1/6W	5%	RI4701C4	R522	CARBON 10K 1/6 W	5%	RI1002C5
R218	CARBON 100K 1/6W	5%	RI1003C3	R523	CARBON 4.7K 1/6 W	5%	RI4701C4
R219	CARBON 22K 1/6 W	5%	RI2202C5	R524	CARBON 100K 1/6 W	5%	RI1003C3
C220	CARBON 10K 1/6 W	5%	RI1002C5	R525	CARBON 1.8K 1/6 W	5%	RI1801C4
C211	CARBON 10K 1/6 W	5%	RI1002C5	R526	CARBON 820K 1/6 W	5%	RI8203C4
R301	CARBON 22K 1/6 W	5%	RI2202C0	R551	CARBON 3.3K 1/6 W	5%	RI3301C3
R302	CARBON 22K 1/6 W	5%	RI2202C0	R552	CARBON 12K 1/6 W	5%	RI1202C2
R303	CARBON 22K 1/6 W	5%	RI2202C0	R553	CARBON 10K 1/6 W	5%	RI1002C5
R304	CARBON 2.2K 1/6 W	5%	RI2201C2	R554	CARBON 22K 1/6 W	5%	RI2202C0
R305	CARBON 2.2K 1/6 W	5%	RI2201C2	R555	CARBON 1K 1/6 W	5%	RI1001C7
R401	CARBON 150K 1/6 W	5%	RI1502C0	R556	CARBON 100K 1/6 W	5%	RI1003C3
R402	CARBON 150K 1/6 W	5%	RI1503C0	R557	CARBON 100K 1/6 W	5%	RI1003C3
R403	CARBON 82K 1/6 W	5%	RI8202C6	R558	CARBON 4.7K 1/6 W	5%	RI4701C4
R404	CARBON 82K 1/6 W	5%	RI8202C6	R559	CARBON 4.7K 1/6 W	5%	RI4701C4
R405	CARBON 10K 1/6 W	5%	RI1002C5	R560	CARBON 1.5K 1/6 W	5%	RI1501C4
R406	CARBON 10K 1/6 W	5%	RI1002C5	R561	CARBON 10 1/6 W	5%	RI0100C5
R407	CARBON 10K 1/6 W	5%	RI1002C5	R562	CARBON 10 1/6 W	5%	RI0100C5
R408	CARBON 10K 1/6 W	5%	RI1002C5	R601	CARBON 2.2K 1/6 W	5%	RI2201C2
R409	CARBON 10K 1/6 W	5%	RI1002C5	R602	CARBON 330K 1/6 W	5%	RI3303C8
R410	CARBON 10K 1/6 W	5%	RI1002C5	R603	CARBON 5.6K 1/6 W	5%	RI5601C8

REF NO	RESISTORS	%	CODE NO	REF NO	RESISTORS	%	CODE NO
R604	CARBON 390 1/6 W	5%	RI3900C5	C205	ELECTROLYTIC 2.2 $\mu$ 50V		PA2250K1
R605	CARBON 6.8K 1/6 W	5%	RI6801C3	C206	POLYESTER 0.015 $\mu$ 50V	5%	PM1535G1
R606	CARBON 3.3K 1/6 W	5%	RI3301C3	C207	N.C		
R607	CARBON 6.8K 1/6 W	5%	RI6801C3	C208	POLYESTER 0.1 $\mu$ 50V	5%	PM1045G0
R608	CARBON 10K 1/6 W	5%	RI1002C5	C209	POLYESTER 0.047 $\mu$ 50V	5%	PM4735G1
R609	CARBON 2.2K 1/6 W	5%	RI2201C2	C210	POLYESTER 0.1 $\mu$ 50V	5%	PM1045G0
R610	CARBON 5.6K 1/6 W	5%	RI5601C8	C211	ELECTROLYTIC 3.3 $\mu$ 50V		PA3350G0
R611	CARBON 2.7K 1/6 W	5%	RI2701C8	C212	ELECTROLYTIC 3.3 $\mu$ 16V		PA3360C7
R612	CARBON 5.6K 1/6 W	5%	RI8201C8	C213	POLYESTER 0.01 $\mu$ 50V	5%	PM1035G4
R613	CARBON 8.2K 1/6 W	5%	RI8201C8	C214	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R614	CARBON 2.2K 1/6 W	5%	RI2201C2	C215	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R615	CARBON 5.6K 1/6 W	5%	RI5601C8	C216	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R616	CARBON 2.7K 1/6 W	5%	RI2701C8	C217	POLYESTER 0.033 $\mu$ 50V	5%	PM3335G0
R617	CARBON 5.6K 1/6 W	5%	RI5601C8	C218	ELECTROLYTIC 0.47 $\mu$ 50V		PA4740G1
R618	CARBON 3.3K 1/6 W	5%	RI3301C3	C219	ELECTROLYTIC 0.3 $\mu$ 16V		PA3360C7
R619	CARBON 100K 1/6 W	5%	RI1003C3	C220	POLYESTER 0.01 $\mu$ 50V	5%	PM1035G4
R620	CARBON 1.2K 1/6 W	5%	RI1201C4	C221	POLYESTER 6800p 50V	5%	PM6825G4
R621	CARBON 12K 1/6 W	5%	RI1202C2	C222	ELECTROLYTIC 10 $\mu$ 50V		PA1060C2
R622	CARBON 10K 1/6 W	5%	RI1002C5	C223	ELECTROLYTIC 1 $\mu$ 50V		PA1050G0
R623	CARBON 4.7K 1/6 W	5%	RI4701C4	C301	CERAMIC 39p 50V		QP3902J2
R624	CARBON 100K 1/6 W	5%	RI1003C3	C302	CERAMIC 39p 50V		QP3902J2
R625	CARBON 1.8K 1/6 W	5%	RI1801C4	C303	CERAMIC 100p 50V		QP1021J7
R626	CARBON 820K 1/6 W	5%	RI8203C4	C304	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R651	CARBON 10K 1/6 W	5%	RI002C5	C305	ELECTROLYTIC 33 $\mu$ 16V		PA3350C7
R652	CARBON 10K 1/6 W	5%	RI002C5	C306	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R653	CARBON 10K 1/6 W	5%	RI002C5	C307	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R654	CARBON 10K 1/6 W	5%	RI002C5	C308	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R655	CARBON 4.7K 1/6 W	5%	RI4701C4	C309	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7
R656	CARBON 4.7K 1/6 W	5%	RI4701C4	C401	CERAMIC 1000p 50V		QP1021J7
R901	CARBON 470 1/6 W	5%	RI4700C6	C402	CERAMIC 1000p 50V		QP1021J7
R902	CARBON 470 1/6 W	5%	RI4700C6	C403	ELECTROLYTIC 2.2 $\mu$ 50V		PA2250K1
R903	CARBON 470 1/6 W	5%	RI4700C6	C404	ELECTROLYTIC 33 $\mu$ 16V		PA3350C7
R904	CARBON 470 1/6 W	5%	RI4700C6	C405	CERAMIC 220p 50V		QP2211J6
CAPACITORS				C452	CERAMIC 220p 50V		QP2211J6
C101	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7	C501	POLYESTER 560p 50V		PS5614G0
C102	CERAMIC 1000p 50V		QP1021J7	C502	POLYESTER 1500p 50V	5%	PM1525G5
C103	ELECTROLYTIC 100 $\mu$ 10V		PA1077B8	C504	POLYESTER 1500p 50V	5%	PM1525G5
C104	POLYESTER 0.01 $\mu$ 50V	5%	PM1035G4	C505	POLYESTER 1500p 50V	5%	PM1525G5
C105	POLYESTER 0.01 $\mu$ 50V	5%	PM1035G4	C505	POLYESTER 1500p 50V	5%	PM1525G5
C106	POLYESTER 0.01 $\mu$ 50V	5%	PM1035G4	C506	POLYESTER 1500p 50V	5%	PM1525G5
C107	POLYESTER 0.01 $\mu$ 50V	5%	PM1035G4	C507	POLYESTER 1500p 50V	5%	PM1525G5
C108	ELECTROLYTIC 0.47 $\mu$ 50V		PA4740G1	C508	POLYESTER 1500p 50V	5%	PM1525G5
C109	POLYESTER 0.01 $\mu$ 50V	5%	PM1035G4	C509	POLYESTER 1500p 50V	5%	PM1525G5
C110	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7	C510	POLYESTER 1500p 50V	5%	PM1525G5
C111	POLYESTER 0.033 $\mu$ 50V	5%	PM3335G0	C511	POLYESTER 1500p 50V	5%	PM1525G5
C112	CERAMIC 2200p 50V		QP2221J2	C512	POLYESTER 4700p 50V	5%	PM4725G5
C113	POLYESTER 4700p 50V	5%	PM4725G5	C513	POLYESTER 4700p 50V	5%	PM4725G5
C114	POLYESTER 33 $\mu$ 16V 50V	5%	PA3360C7	C514	POLYESTER 390p 50V	5%	PS3914G4
C201	N.C			C515	POLYESTER 390p 50V	5%	PS3914G4
C202	N.C			C516	POLYESTER 10 $\mu$ 110V	5%	PA1069C2
C203	CERAMIC 10p 50V		QP1001J6	C551	ELECTROLYTIC 4.7 $\mu$ 50V		PA4750C3
C204	ELECTROLYTIC 22 $\mu$ 16V		PA2260C6	C552	ELECTROLYTIC 47 $\mu$ 16V		PA4760C8
				C553	ELECTROLYTIC 470 $\mu$ 16V		PA4777C8
				C561	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7

REF NO	RESISTORs	%	CODE NO	REF NO	RESISTORs		CODE NO
C562	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7	Q651	KTC 1815		TC1815Y7
C601	POLYESTER 560p 50V	5%	PS5614G0	Q652	KTA 1015		TA1015Y0
C602	POLYESTER 1500p 50V	5%	PM1525G5	Q653	KTC 1815		TC1815Y7
C603	POLYESTER 1500p 50V	5%	PM1505G5	Q654	KTC 1815		TC1815Y7
C604	POLYESTER 1500p 50V	5%	PM1505G5	Q901	KTC 1959		TC1959Y4
C605	POLYESTER 1500p 50V	5%	PM1505G5	Q902	KTA 562		TA0562Y3
C606	POLYESTER 1500p 50V	5%	PM1505G5				
C607	POLYESTER 1500p 50V	5%	PM1505G5	REF NO	ICs		CODE NO
C608	POLYESTER 1500p 50V	5%	PM1505G5	IC101	CXA-1081M		UD0070S6
C609	POLYESTER 1500p 50V	5%	PM1505G5	IC201	CXA-1082 AQ		UD0090S7
C610	POLYESTER 1500p 50V	5%	PM1505G5	IC301	CXD-1135Q		UD0080S2
C611	POLYESTER 1500p 50V	5%	PM1505G5	IC302	CXK-5816 PN-15V		UB0010S2
C612	POLYESTER 4700p 50V	5%	PM4725G5	IC303	PCM-54HP		UD0040B3
C613	POLYESTER 4700p 50V	5%	PM4725G5	IC401	LC-6510-3066		UA0041S1
C614	POLYESTER 390p 50V	5%	PS3914G4	IC402	HD-14015 BP		UL0060M8
C615	POLYESTER 390p 50V	5%	PS3914G4	IC403	HD-74LS74AP		LC0030H2
C616	ELECTROLYTIC 10 $\mu$ 16V		PA1069C2	IC404	IR 94558		UO0010S4
C651	ELECTROLYTIC 0.22 $\mu$ 50V		PA2249G8	IC451	IR3F02		UO0030S5
C901	ELECTROLYTIC 220 $\mu$ 16V		PA2287C2	IC501	IR3F02		UO0030S5
C902	ELECTROLYTIC 220 $\mu$ 16V		PS2287C2	IC502	IR3F02		UO0030S5
C903	ELECTROLYTIC 470 $\mu$ 16V		PA4777B5	IC560	HD 4053 BC		UC0050H3
C904	ELECTROLYTIC 470 $\mu$ 16V		PA4777B5	IC561	IR 9082		UD0020S0
C905	ELECTROLYTIC 470 $\mu$ 16V		PA4777O2	IC601	IR3F02		UO0030S5
C906	ELECTROLYTIC 100 $\mu$ 25V		PA1077D5	IC602	IR3F02		UO0030S5
C907	ELECTROLYTIC 100 $\mu$ 25V		PA1077D5	IC901	GL 7805		UU0010G7
C909	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7	IC902	GL 7905		UU0020G3
C910	ELECTROLYTIC 33 $\mu$ 16V		PA3360C7				
C911	ELECTROLYTIC 220 $\mu$ 16V		PA2277C6	REF NO	DIODEs		CODE NO
C912	ELECTROLYTIC 220 $\mu$ 16V		PA2277C6	D401	IN4148		KS0012K2
				D402	IN4148		KS0012K2
				D403	IN4148		KS0012K2
				D551	IN4148		KS0012K2
				D901	IN4002		KR0042K3
				D902	IN4002		KR0042K3
				D903	IN4002		KR0042K3
				D904	IN4002		KR0042K3
				D905	IN4002		KR0042K3
				D906	IN4002		KR0042K3
				D907	IN4002		KR0042K3
				D908	IN4002		KR0042K3
				D909	IN4148		KS0042K2
				REF NO	VARIABLE RESISTORs		CODE NO
				VR101	2KB		VH0400U3
				VR102	20KB		VH0430U0
				VR103	50KB		VH0500U6
				VR104	20KB		VH0430U0
				VR105	20KB		VH0430U0
				VR201	2KB		VH0400U3
REF NO	TRANSISTORs		CODE NO				
Q101	KTA 1015		TA1015Y0				
Q102	KTC 1815		TC1815Y7				
Q103	KTC 1815		TC1815Y7				
Q201	KTA 562		TA0562Y3				
Q202	KTC 1959		TC1959Y4				
Q203	KTA 562		TA0562Y3				
Q204	KTC 1959		TC1959Y4				
Q205	KTA 562		TA0562Y3				
Q206	KTC 1959		TC1959Y4				
Q207	KTA 562		TA0562Y3				
Q208	KTC 1959		TC1959Y4				
Q209	KTC 1815		TC1815Y7				
Q210	KTC 1815		TC1815Y7				
Q401	KTA 965		TA0965Y0				
Q402	KTC 2235		TC2235Y6				
Q403	KTC 1815		TC1815Y7				
Q404	KTC 1815		TC1815Y7				
Q551	KTC 1815		TC1815Y7				
Q552	KTA 1015		TA1015Y0				
Q553	KTA 1015		TA1015Y0				
Q554	KTC 1815		TC1815Y7				
Q555	KTC 1815		TC1815Y7				

REF NO	INDUCTORS		CODE NO	REF NO	RESISTORS	%	CODE NO
L401	LAL04KB 100K		OC0017D2	R803	CARBON 82 1/4W	5%	RE0820E5
L402	LAL04KB 100K		OC0017D2	R804	CARBON 82 1/4W	5%	RE0820E5
L403	LAL04KB 100K		OC0017D2	R805	CARBON 82 1/4W	5%	RE0820E5
HS901	HEAT SINK		EG0120N8	R806	CARBON 82 1/4W	5%	RE0820E5
HS902	HEAT SINK		EG0120N8	R807	CARBON 82 1/4W	5%	RE0820E5
CP101	LWL-0640-08		NW1320H2	R809	CARBON 4.7K 1/4W	5%	RE4701E8
CP102	LAL-0640-08		NW1815H0	R810	CARBON 4.7K 1/4W	5%	RE4701E8
CP103	LWL-0640-06		NW1310M6	R811	CARBON 4.7K 1/4W	5%	RE4701E8
CP104	LWL-0640-05		NW1300H1	R808	CARBON 3.3K 1/4W	5%	RE3301E7
CP105	LWL-0640-04		NW1290H7				
CP106	LWL-0640-04		NW1290H7	REF NO	ICs		CODE NO
CP107	LWL-0640-02		NW1270H6	IC210	LB1216 (LED DRIVER)		UL0020S3
CP108	LWL-0640-02		NW1330H7	IC211	SN74NS145N (TTL IC)		UL0045M7
CP109	LWL-0640-03		NW1280H2	REF NO	DIODEs		CODE NO
CP110	LWL-0640-03		NW1280H2	D801	IN4148		KS0012K2
CP111	LWL-0640-02		NW1270H6	D802	IN4148		KS0012K2
CP112	LWL-0640-03		NW1280H2	D803	IN4148		KS0012K2
CP113	LWL-0640-03		NW1280H6	D804	IN4148		KS0012K2
				D805	IN4148		KS0012K2
				D806	IN4148		KS0012K2
				D807	IN4148		KS0012K2
				D808	IN4148		KS0012K2
REF NO	FUSE PCB		CODE NO	REF NO	MISCELLANEOUS		CODE NO
C801	CERAMIC CAPACITOR 0.01 $\mu$ (LINE CAPACITOR) HOLDER FUSE FUSE (0.2A NM TYPE) TAP STUD	2EA	QM4720MO	FL301	LED DISPLAY (2 digit)		KL0004S0
REF NO	PANEL PCB		CODE NO	FL302	LED DISPLAY (4 digit)		KL0103S5
R801	CARBON 82 1/4W	5%	RE0820E5	D901	LED SL-106		KL0005S7
R802	CARBON 82 1/4W	5%	RE0820E5	D902	LED SL-106		KL0005S7
				D903	LED SL-106		KL0005S7
				D904	LED SL-106		KL0005S7
				D905	LED SL-106		KL0005S7
				D906	LED SL-206		KL0003S5
				D907	LED SL-202		KS0012K2
				D908	LED SL-106		KS0005S7
				REF NO	VR PCB		CODE NO
					VJ4512G PRN 12.5G 3 15A 20K $\times$ 2		VS0070K6
				CP112	SHIELD WIRE ASS'Y 3P		
				CP113	SHIELD WIRE ASS'Y 3P		

MEMO

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**CAUTION;** Parts are subject to change for improvement.